

for Ca, Mg, Na, and K in *B. glabrata* infected with a larval trematode have not been reported before.

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Literature Cited

- Beers, K., B. Fried, T. Fujino, and J. Sherma. 1995. Effects of diet on the lipid composition of the digestive gland-gonad complex of *Biomphalaria glabrata* (Gastropoda) infected with larval *Echinostoma caproni* (Trematoda). *Comparative Biochemistry and Physiology* 110B:729-737.
- Gabrashanska, M., A. Damyanova, and I. Kanev. 1991. Mineral composition of *Echinostoma revolutum* (Froelich, 1802) and its hosts *Lymnaea stagnalis* (L.) *Khelminthology* 31:3-7 (in Bulgarian with English summary).
- Layman, L., B. Fried, A. Dory, J. Sherma, and K. Koehnlein. 1996. Effects of *Echinostoma trivolvis* (Trematoda) infection on metallic ions in the host snail *Helisoma trivolvis* (Gastropoda). *Parasitology Research* 82:19-21.
- Nduka, W. K., and A. D. Harrison. 1980. Cationic responses of organs and haemolymph of *Biomphalaria pfeifferi* (Krauss), *Biomphalaria glabrata* (Say) and *Helisoma trivolvis* (Say) (Gastropoda: Planorbidae) to cationic alternations of the medium. *Hydrobiologia* 68:119-138.

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Research Note

Gastrointestinal Helminths from Juvenile Red Drum, *Sciaenops ocellatus*, and Atlantic Croaker, *Micropogonias undulatus* (Sciaenidae), in East Matagorda Bay, Texas

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ABSTRACT: Juvenile *Sciaenops ocellatus* ($N = 20$) and *Micropogonias undulatus* ($N = 8$) from East Matagorda Bay, Texas, were examined for gastrointestinal helminths. A total of 7 parasite species or groups were recovered, 5 of which were common to both *S. ocellatus* and *M. undulatus*. No parasites were found to be unique to *M. undulatus*, although significant differences in the mean intensity of *Lecithaster confusus* (Hemiuridae) and unidentified cestode larvae were found. Differences in diet, which correlate with differences in mean length, between *S. ocellatus* and *M. undulatus* are believed to be the basis for observed differences in the mean intensity of gastrointestinal helminths.

KEY WORDS: *Lecithaster confusus*, *Bucephaloides* spp., Sciaenidae, red drum, *Sciaenops ocellatus*, Atlantic croaker, *Micropogonias undulatus*, *Diplomonorchis leiostomi*.

Although the red drum, *Sciaenops ocellatus* (Linnaeus), and Atlantic croaker, *Micropogonias*

undulatus (Linnaeus), are important sportfish along the Gulf of Mexico coast, few studies have been conducted on their gastrointestinal helminths, and much of the information available results from survey reports. Particularly lacking is quantified data concerning parasitic infections in juvenile red drum and Atlantic croaker.

Many reports of parasites from red drum and Atlantic croaker are a result of the inclusion of these species in general surveys of fishes from a particular area. Loftin (1960) published an annotated checklist of trematodes and cestodes from northwest Florida and included a report of "*Bucephalopsis* sp." from *Sciaenops ocellata* in Alligator Harbor, Florida. Riggan and Sparks (1962) later identified this parasite as a new species, *Bucephaloides megacirrus*, and provided a full description including its occurrence in red drum from Grand Isle, Louisiana. Nahhas and Short (1965) published a list of the digenetic trematodes of fishes from Apalachee Bay, Florida, and

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Table 1. Gastrointestinal helminths recovered from red drum, *Sciaenops ocellatus*, and Atlantic croaker, *Micropogonias undulatus*, from East Matagorda Bay, Texas.

Parasite	<i>Sciaenops ocellatus</i> (N = 20)		<i>Micropogonias undulatus</i> (N = 8)	
	Prevalence	Intensity [mean \pm SD (range)]	Prevalence	Intensity [mean \pm SD (range)]
Digenea				
<i>Lecithaster confusus</i> (USNPC Nos. 85231, 85235)*	80%	12.1 \dagger \pm 19.9 (1–82)	100%	26.8 \dagger \pm 11.5 (4–42)
<i>Bucephaloides caecorum</i> (USNPC Nos. 85233, 85237)*	65%	4.2 \pm 3.8 (1–16)	50%	3.5 \pm 2.1 (2–7)
<i>Bucephaloides megacirrus</i> (USNPC No. 85234)	30%	2.7 \pm 1.8 (1–5)	—	—
<i>Diplomonorchis leiostomi</i> (USNPC Nos. 85232, 85236)*	5%	2.0 \pm 0 (2)	37.5%	3.3 \pm 1.7 (1–5)
Cestoda				
Unidentified cestode larvae (USNPC Nos. 85239, 85241)*	75%	1,403 \pm 1,808 (2–5,769)	100%	72.4 \ddagger \pm 172.6 (1–528)
Tetraphyllidea larvae (USNPC Nos. 85238, 85240)*	45%	6.3 \pm 6.3 (2–23)	50%	3.8 \pm 1.1 (2–4)

* The first USNPC number represents helminths recovered from *S. ocellatus*, while the second USNPC number represents helminths recovered from *M. undulatus*.

\dagger Significant at $P < 0.05$, $df = 22$, $t = -1.75$.

\ddagger Significant at $P < 0.05$, $df = 21$, $t = 1.85$.

reported 3 species (*B. megacirrus* Riggins and Sparks, 1962, *Opecoeloides fimbriatus* (Linton, 1934) Soganderes-Bernal and Hutton, 1959, and *Lecithochirium mecosaccum* Manter, 1947) from red drum and 3 species (*O. fimbriatus*, *L. parvum* Manter, 1947, and *Sterrhurus musculus* Looss, 1907) from Atlantic croaker. Corkum (1968) reported on the family Bucephalidae in fishes from the northern Gulf of Mexico and included Mississippi Sound, Mississippi, as a new locality record for *B. megacirrus* in red drum. Overstreet (1983) reported at least 3 cestodes, 9 digenetic trematodes, and 6 nematodes from red drum. Virtually all of the parasites, however, were recovered from adult fish. Thoney (1991) reported 4 cestodes, 3 digenetic trematodes, and 1 nematode from 127 juvenile Atlantic croaker from Pamlico Sound and 1 cestode, 7 digenetic trematodes, and 1 nematode from 103 juvenile Atlantic croaker from Chesapeake Bay, along the Atlantic coast.

Due to the relative paucity of information concerning the parasites of red drum and Atlantic croaker from the Texas Gulf coast, as well as the importance of these fish species to the sportfishing industry, a brief survey was conducted on the gastrointestinal helminths of juvenile red drum and Atlantic croaker in East Matagorda Bay, Texas.

Twenty juvenile red drum (mean standard length [SL] = 6.4 cm \pm 1.4 SD, range 4.3–9.2 cm) and 8 juvenile Atlantic croaker (mean SL = 4.6 cm \pm 0.4 SD, range 4.1–5.4 cm) were collected by bag seine from East Matagorda Bay during February and March 1994. All fish were placed in individual plastic bags and transported on ice to Texas A&M University. The digestive tract extending from the esophagus to the rectum was removed and examined for helminths. Recovered parasites were fixed in alcohol/formalin/acetic acid, stained in Semichon's carmine, and mounted in Kleermount®. The terms prevalence and mean intensity are used as defined by Margolis et al. (1982). Differences in the mean intensity of endohelminths were compared using a 2-tailed t -test.

The parasites recovered are listed in Table 1. Two species of *Bucephaloides* were found in red drum, *B. caecorum* Hopkins, 1956, and *B. megacirrus*. Only *B. caecorum* was also found in Atlantic croaker. No nematodes were found within the lumen of the gastrointestinal tract. The cestodes were represented by 2 distinct groups, both larval forms. Larval tetraphyllids were found in 45% (9 of 20) and 50% (4 of 8) of *S. ocellatus* and *M. undulatus*, respectively. However, due to their immature state, conclusive identification to genus could not be made.

The most notable cestode present in the survey was represented by numerous unidentifiable scolices, often reaching several thousand in number within a single infected host. Cestode larvae that appear identical to those recovered in this survey have been reported from many fish and invertebrate hosts, especially shrimp (Kruse, 1959; Feigenbaum, 1975), although none have been linked with an adult.

The mean intensity of *Lecithaster confusus* Odhner, 1905, was significantly greater ($P < 0.05$) in *M. undulatus* than in *S. ocellatus* (26.8 versus 12.1). When these differences are considered in light of the mean SL of the host, the accompanying differences in diet, and the life cycle of *Lecithaster confusus*, such differences in mean intensity might be expected. *Lecithaster confusus* utilizes the copepod *Acartia tonsa* Dana, 1849, and presumably other related copepods, as the second intermediate host (Hunninen and Cable, 1943). Copepods also constitute a large portion of the diet of sciaenids less than 5.0 cm long (Matlock, 1990). Because the mean SL of Atlantic croaker was 4.6 cm, the preponderance of copepods in their diet would lead to a greater intensity of those parasites that utilize copepods as intermediate hosts, including *Lecithaster confusus*.

The mean intensity of the unidentified cestode larvae is significantly greater ($P < 0.05$) in *S. ocellatus* than in *M. undulatus* (1,403 versus 72.4). Again, these differences appear to be related to diet. As the size of *S. ocellatus* and *M. undulatus* increases beyond 5.0 cm, their diet shifts to include larger prey items. These items include a greater number of fish and shrimp (Matlock, 1990), both of which have been found to commonly harbor unidentified cestode larvae.

The correlation between diet and the mean intensity of parasites is further evidenced by the occurrence of the genus *Bucephaloides*. When considered as a genus, the mean intensity of *Bucephaloides* is greater in red drum than in Atlantic croaker. Species of *Bucephaloides* tend to use fish as the second intermediate host and, thus, would be expected to have a greater intensity in the larger red drum.

In summary, the general parasite fauna of Texas Gulf coast red drum and Atlantic croaker appear very similar. Of the 7 gastrointestinal helminths recovered from juvenile red drum, 5 were also recovered from juvenile Atlantic croaker. However, significant differences in mean intensity of *Lecithaster confusus* and the unidentified

cestode larvae were found. Differences in diet with increasing host length are believed to be the basis for the differences in the mean intensity of *L. confusus* and the unidentified cestode larvae.

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Literature Cited

- Corkum, K. C.** 1968. Bucephalidae (Trematoda) in fishes of the northern Gulf of Mexico: *Bucephaloides* Hopkins, 1954 and *Rhipidocotyle* Diesing, 1858. Transactions of the American Microscopical Society 87:342-349.
- Feigenbaum, D. L.** 1975. Parasites of the commercial shrimp *Penaeus vannamei* Boone and *Penaeus brasiliensis* Latreille. Bulletin of Marine Science 25:491-514.
- Hunninen, A. V., and R. M. Cable.** 1943. The life history of *Lecithaster confusus* Odhner (Trematoda: Hemiuridae). Journal of Parasitology 29:71-79.
- Kruse, D. N.** 1959. Parasites of the commercial shrimps, *Penaeus aztecus* Ives, *P. duorarum* Burkenroad and *P. setiferus* (Linnaeus). Tulane Studies in Zoology 7:123-144.
- Loftin, H.** 1960. An annotated check-list of trematodes and cestodes and their vertebrate hosts from northwest Florida. Quarterly Journal of the Florida Academy of Science 23:302-314.
- Margolis, L., G. W. Esch, J. C. Holmes, A. M. Kuris, and G. A. Schad.** 1982. The use of ecological terms in parasitology (report of an ad hoc committee of The American Society of Parasitologists). Journal of Parasitology 68:131-133.
- Matlock, G. C.** 1990. The life history of red drum. Pages 1-21 in G. W. Chamberlain, R. J. Miget, and M. G. Haby, eds. Red Drum Aquaculture. TAMU-SG-90-603, Texas A&M University Sea Grant Publication, College Station, Texas.
- Nahhas, F. M., and R. B. Short.** 1965. Digenetic trematodes of marine fishes from Apalachee Bay, Gulf of Mexico. Tulane Studies in Zoology 12:39-50.
- Overstreet, R. M.** 1983. Aspects of the biology of the red drum, *Sciaenops ocellatus*, in Mississippi. Gulf Research Reports, Supplement I, pages 45-68, June 1983.
- Riggin, G. T., and A. K. Sparks.** 1962. A new gastrostome, *Bucephaloides megacirrus*, from the redfish, *Sciaenops ocellata*. Proceedings of the Helminthological Society of Washington 29:27-29.
- Thoney, D. A.** 1991. Population dynamics and community analysis of the parasite fauna of juvenile spot and Atlantic croaker in two estuaries along the middle Atlantic coast of the United States. Journal of Fish Biology 39:515-534.